———, in Mohr, Charles. Plant Life of Alabama. Cont. U. S. Nat. Herb. 6: 1–921. 1901. A list of 225 species and varieties of lichens with notes on distribution, pp. 267–283.

———, in Delabarre, E. B. Report of the Brown-Harvard Expedition to Nachvak, Labrador, in the year 1900. Bull. Geog. Soc. Phila. 3: 65–212. 1902. An annotated list of 43 lichens, pp. 196–200.

——— Notes on New Species of Lichens collected by the Harriman Expedition. Science, 15: (new series) 408. 14 March, 1902. Abstract of paper read before the Society of Plant Morphology and Physiology. *Verrucaria fulva* and *Pertusaria pocillaria* were mentioned as new species and subsequently described. An *Endocarpon* was also mentioned as new, but has not been described.

———, The Lichens of Alaska, Harriman Alaska Expedition, 5: Cryptogamic Botany. 1–424. 1904. A list of 217 species and varieties of lichens collected by the Harriman Expedition, with keys, copious notes and a bibliography. Of the Harriman Expedition lichens, 76 are reported as new to Alaska. Other lichens collected in Alaska are given in brief summaries below each genus, making the total number of lichens known for Alaska 462. Total number recorded as new to Alaska in the paper is 84. Of these, two, *Verrucaria fulva* and *Pertusaria pocillaria*, are described as new species. Pp. 67–149. Plates VIII and IX.

——— and Seymour, A. B. Decades of North American Lichens. 1892 to 1905. Three hundred and sixty numbers were issued.

———, T. A. Williams and A. B. Seymour. Lichenes Boreali-Americani. 1894 to 1905. Two hundred and eighty numbers were issued.

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FURTHER NOTES ON CLADONIAS. X.

Cladonia decorticata and Cladonia degenerans.

Bruce Fink.

As to the relationships of *Cladonia decorticata*, it has been considered a variety of *Cladonia pyxidata*, to be considered in the next paper of this series and has also been placed as a variety of *Cladonia pityrea*. From material in the writer's herbarium, it is apparent enough that specimens might easily be confused with little-branched and decorticate conditions of *Cladonia squamosa* as well as with some conditions of *Cladonia furcata scabriuscula*. It seems to the writer that, of the species considered in this series, the nearest relationship is with *Cladonia squamosa*, though Dr. Wainio has placed several of the other species already considered or to follow in the series between. The relationship with *Cladonia furcata scabriuscula*, especially its less branched and more decorticate forms, seems quite near, while that with *Cladonia pityrea* is not at all close. Examination of an excellent series of European specimens of *Cladonia pityrea*, received from L. Scriba, reveals a closer relationship than the last, and yet it does not appear that *Cladonia decorticata* should be confused with *Cladonia pityrea*.

A practical difficulty in distinguishing between certain forms of *Cladonia degenerans* and *Cladonia gracilis dilatata* is mentioned below, and the writer has also had difficulty in separating certain specimens from forms of *Cladonia crispata.* However, this difficulty will not often be met.

It is certain enough that the two species considered in this present paper are not so closely related to each other, as is each one to some other *Cladonia*, but it is impossible, in the present state of knowledge of the genus, if at all, to place the Cladonias all in any probable continuous genetic series.

CLADONIA DECORTICATA ×2.

CLADONIA DECORTICATA (Flk.) Spreng. Linn. Sust. Veg. 4:271. 1827. Primary thallus finally disappearing and usually more or less replaced by similar laciniate or crenate somewhat concave or involute, scattered or clustered squamules, which are usually small, 1–4 mm. long, and 1–2 mm. wide, light sea-green above varying toward olivaceous, below whitish or brownish toward the base. Podetia arising from the surface of the primary thallus; 9–42 mm. long and 0.75–2 mm. in diameter; cylindrical, cupless, simple or more or less dichotomously or irregularly branched, the branches commonly erect or spreading; the fertile apices often dilated the sterile ones obtuse or subulate: the sides sometimes fissured; clustered or subsolitary, erect or rarely ascend-

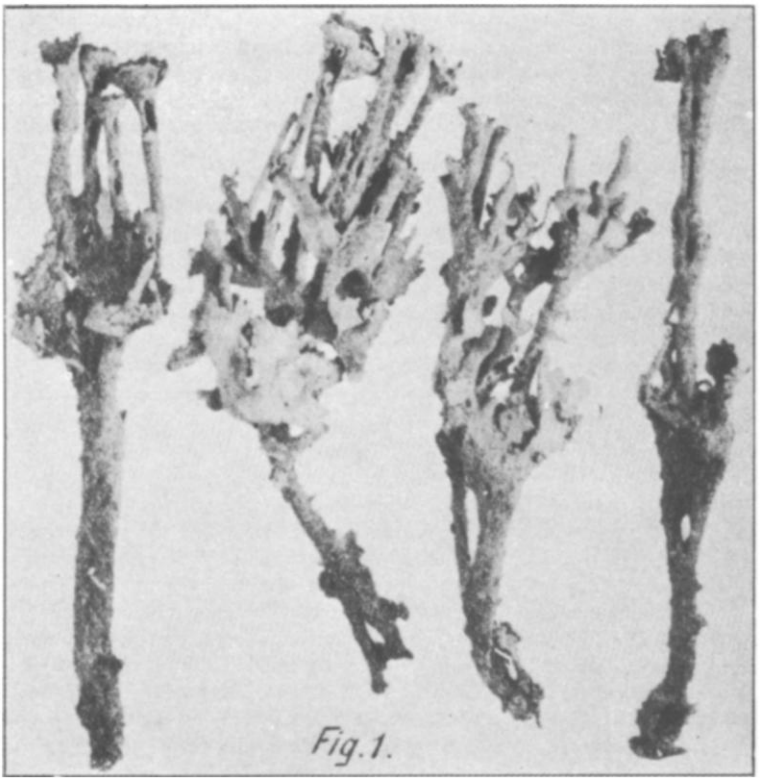
ing, or even decumbent; variously sorediate, areolate and squamulose, the latter especially toward the base; more or less decorticate between the areoles or squamules even toward the base; pale sea-green or brownish, the decorticate portions white. Apothecia middling sized, 0.75–6.5 mm. in diameter; confluent or conglomerate, at the apices of the podetia or branches; concave, flat or convex; thinly margined or finally immarginate: usually brown. Hypothecium pale. Hymenium pale or pale-brownish below and brownish above. Paraphyses usually simple, commonly thickened and brownish toward the apex. Asci clavate or cylindrico-clavate. Fig. 2.

On various kinds of soil, especially in dry sunny places. My own collections in Minnesota on thin earth over rocks. Seen by the writer from Canada (J. Macoun) and from Minnesota (Bruce Fink). Wainio places Tuck. Lich. Amer. Exs. no. 124, from the White Mountains here. J. Macoun's Cat. Canadian Plants, Part VII, records the plant from various parts of British America and from Newfoundland, Alaska and adjacent islands. Known also in Europe, Asia and Africa.

The plant used for illustration was collected by the writer at Kettle Falls, Minnesota, and determined by Dr. Wainio.

CLADONIA DEGENERANS (Flk.) Spreng. Linn. Syst. Veg. 4: 273. 1827. The primary thallus more or less evanescent, composed of usually medium sized, irregularly laciniately lobed, flat or somewhat involute or convolute, ascending, scattered or clustered squamules, which are 2–12 mm. long and 1 5–10 mm. wide; sea-green varying toward olivaceous above and white below or darkening toward the base. Podetia arising from the surface of the primary thallus; 10–55 mm. long and 0.5–3.5 mm. in diameter; more or less irregularly cylindrical or turbinate; erect or ascending; the cortex areolate with commonly elevated and frequently scattered areoles, the portions between the areoles subtomentose; sometimes squamulose; sea-green varying toward ashy or olivaceous, the decorticate portions white; the sides rarely more or less grooved and perforate; occurring in larger or smaller clusters, frequently cup-bearing and proliferate. Cups 1.5–8.5 mm. in diameter, abruptly or gradually dilated; usually more or less irregular: urceolate or shallow; commonly dentate or proliferate, the proliferations arising either from the margin or from the center of the cup and either solitary or radiately arranged; the ranks 1–5 in number and the lowest 3–20 mm. long; the sterile apices scyphiform, cornute or rarely subulate. Apothecia small to medium sized 0.5–2.5 mm. in diameter; regular or finally lobate and perforate; solitary or variously clustered at the apices of podetia or proliferations; convex or flat, immarginate; brown, varying toward pale or reddish-brown. Hypothecium pale. Hymenium pale below and pale-brownish above. Paraphyses simple or branched, frequently thickened and brownish toward the apex. Asci cylindrico-clavate. Ours sterile and the spore and apothecial characters taken from European material. Fig. 1.

On earth in open, dry places or rarely in dry woods. Rarely on earth over rocks. Examined by the writer from Wyoming (Aven Nelson), from Alaska (Wm. Trelease) and from several localities in Minnesota (Bruce



CLADONIA DEGENERANS. × 3

Fink). Wainio's distribution adds Port Clarance, Greenland, Newfoundland, Miquelon, White Mountains, Massachusetts, Virginia and several localities in British America. The above distribution indicates that the plant is to be looked for throughout the northern portion of the United States and northward, but still it is not well known. Found in all the grand divisions.

Dr. Wainio has seen fit to divide the species into four forms, two of which he has recognized in material sent him by the writer from Minnesota. Of eight of these specimens submitted, Dr. Wainio referred two to the first form below, one to the second below and five to the species without attempting to refer to a form. Dr. Wainio admits in his Monograph that the four forms are scarcely constant or distinct enough to be of any taxonomic value. So we can do no better for the present than to record below two forms to which our three American forms have been referred by the best authority on the Cladonias. Future world-wide study of the species may enable workers to understand the species and its varieties.

CLADONIA DEGENERANS EUPHOREA (Ach.) Nyl. Syn. Lich. 1: 200. 1858. Podetia without squamules, or the lower portion sparsely squamulose, the sterile cups regular and the fertile ones subregular, sometimes proliferate.

The plants determined by Dr. Wainio were collected at Kettle Falls and at Harding, both in northern Minnesota. Not known elsewhere in America. Well known in Europe One of our specimens submitted to Dr. Wainio looked suspiciously like *Cladonia gracilis dilatata*, and was submitted a second time with the result that it was returned simply *Cladonia degenerans*. We can not question Dr. Wainio's determination and now see why he placed the plant as he did, but the practical difficulty for the ordinary worker in distinguishing such forms is very great. For the illustration of this form, we give in one figure plants from each of the two collections. A glance at the figure will show those acquainted with *C. gracilis*, which plants of the figure resemble it most strongly.

CLADONIA DEGENERANS CLADOMORPHA (Ach.) Wainio, Mon. Clad. Univ. 1: 141. 1894. Podetia without squamules or sparsely squamulose toward the base, cup-bearing, the cups irregular with lacerate and sometimes proliferate margins, or sometimes abortive or disappearing in the proliferations.

A single collection made at Emo along the northern boundry of Minnesota, was placed here by Dr. Wainio. Not known elsewhere in America. Frequent in Europe.

Oxford, Ohio.

CATHARINEA IN HARTFORD COUNTY.

ANNIE LORENZ.

Hartford County, in the Connecticut valley, lies chiefly in a Triassic region, although the Eastern Highlands enter the southeast corner of the county at South Glastonbury.

The main formations are sandstones and shales, but the trap dykes are the most conspicuous features of the landscape. The country east of the river is largely sand-plain, extending to the foothills of the Highlands. This, with its western exposure, gives East Hartford a rather warmer climate than that of the western side of the river, and produces a flora in some respects curiously resembling that of the shore of Long Island Sound. This makes a good variety of soils, as the trap, a lime-and-soda feldspar, furnishes the modicum of lime which is necessary to so many species.

From a geological standpoint, mosses may be roughly divided into three classes according to their habitat: those requiring lime in the substratum on which they grow; those that sedulously avoid limestone, *Kalkmeidend*, as the Germans say, and those that are not particular. Kerner holds that it is not that certain species like the limestone, but that they can tolerate it, while the others cannot. However that may be, a region containing any limestone has always a much richer flora than one without. This applies with equal emphasis to the Hepaticae.

The third class above mentioned includes most of the commoner cosmopolitan mosses, and among them the Catharineae.